and third directions between the magnet array and the coil array generated by the forces generated by the determined currents; (3) determining current adjustments to compensate for or cancel out the resultant torque; and (4) applying a sum of the determined currents and determined current adjustments to the coils to interact with the magnetic fields of the magnet array.

Page 8, please amend the paragraph beginning on line 29 and bridging pages 8 and 9 to read as follows:

(Amended) As shown in **FIG. 1**, each coil **26** in the coil array **22** has approximately the same shape and size. Although the coils **26** having approximately the same shape and size are preferred, the coils of the coil array **22** may have varying shapes and/or sizes. Each coil **26** preferably covers as much of an area of one coil period in both the X and Y directions as possible in order to maximize the force generated from the interaction between the magnet array **24** and the coil array **22** and thus minimizes the coil power input necessary to achieve a desired amount of force. A rectangular profile of the coil **26** maximizes the area occupied by each coil **26** within the area defined by the coil periods **28, 30** and thus is preferred. As is evident, when the periods **28** and **30** are approximately equal, the profile of the coil **26** approximates a square.

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Page 16, please amend the paragraph beginning on line 30 and bridging pages 16 and 17 to read as follows:

(Amended) The current commutation scheme is applied to the coils within the magnetic field of the magnets of the magnet array **24**. These are referred to as the active coils and include coils which are only partially within the magnetic field of the magnets of the magnet array **24**. The current supplied through the active coils interact with the magnetic field of the magnet array **24** to generate a force between the magnet and coil arrays **24, 22**. No current is applied to the inactive coils, coils that are not within the magnetic field of the magnets of the magnet array **24**. Thus, all coils that are wholly or partially within the magnetic filed of the magnet array **24** are utilized to generate forces to control the stage in six degrees of freedom.

Page 17, please amend the paragraph beginning on line 25 to read as follows:

(Amended) To achieve six degree of freedom control of the moving magnet motor, the coils need to generate forces in the X, Y, Z directions. As is evident, forces in the X, Y, and Z directions provide linear control and movement in the X, Y, and Z directions. These forces can also generate torques about the X, Y, and Z axes, since there are multiple coils at different X, Y positions. For example, two coils separated in the X direction can produce different amounts of Z force to create a torque about the Y axis.

Page 28, please amend the paragraph beginning on line 13 and bridging pages 28 and 29 to read as follows:

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(Amended) The method of the invention for independently controlling the forces and torque generated by the electric motor in six degrees of freedom preferably includes determining the uncompensated torque about the X, Y, and Z axis generated from the commutation scheme using the desired force vector $\boldsymbol{R}$ and then determining the correction terms $\boldsymbol{\Delta_x}$, $\boldsymbol{\Delta_y}$, $\boldsymbol{\Delta_z}$ that make the total torque equal the desired value. The uncompensated torque about the X, Y, and Z axis generated from the commutation scheme may be determined using force vector terms $\boldsymbol{R_x}$, $\boldsymbol{R_y}$, $\boldsymbol{R_z}$ and the lower-left nine elements of matrix $\boldsymbol{A}$. The correction terms $\boldsymbol{\Delta_x}$, $\boldsymbol{\Delta_y}$, $\boldsymbol{\Delta_z}$ may be determined by dividing the desired torque minus the uncompensated torque about the X, Y, and Z axis by -6π. The torque-compensated commutation equations thus use the terms $\boldsymbol{R_x}$, $\boldsymbol{R_y}$, $\boldsymbol{R_z}$, $\boldsymbol{\Delta_x}$, $\boldsymbol{\Delta_y}$, and $\boldsymbol{\Delta_z}$.

Page 30, please amend the paragraph beginning on line 28 and bridging pages 30 and 31 to read as follows:

(Amended) The illumination system includes an illumination source **851** and an illumination optical assembly **852**. The illumination source **851** emits a beam (irradiation) of light energy. The illumination optical assembly **852** guides the beam of light energy from the illumination source **851** to the optical assembly **804**. The beam illuminates selectively different portions of the reticle **806** and exposes the wafer **808**. In **FIG. 11**, the illumination system **802** is illustrated as being supported above the reticle stage assembly **810**. However, the illumination system **802** is secured to one of the

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sides of the frames and the energy beam from the illumination source **851** is directed to above the reticle stage assembly **810** with the illumination optical assembly **852**.

Page 31, please amend the paragraph beginning on line 11 to read as follows:

(Amended) The reticle stage assembly **810** holds and positions the reticle **806** relative to the optical assembly **804** and the wafer **808**. Similarly, the wafer stage assembly **820** holds and positions the wafer **808** with respect to the projected image of the illuminated portions of the reticle **806** in the operation area. In **FIG. 11**, the wafer stage assembly **820** utilizes the moving magnet electric motor **812** having features of the present invention. Depending upon the design, the lithography system **800** can also include additional wafer stage assemblies **820** to increase the throughput of the lithography system **800**.

<u>IN THE CLAIMS:</u>

Please cancel claims 4, 21, and 34 without prejudice or disclaimer of the subject matter thereof and amend claims 1, 3, 6, 9-12, 15-20, 23, 29, 32, 33, 35, 37, 38, and 42 to read as follows:

1. (Amended) A method for controlling a planar electric motor comprising a magnet array having magnets with magnetic fields and a coil array comprising coils generally disposed in a plane, for positioning in six degrees of freedom, comprising:

determining currents to be applied to coils to generate forces between the magnet array and the coil array in first, second and third directions, the first and second

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